

Appl. No. 10/759,059
Amendment dated: November 13, 2007
Reply to OA of: August 22, 2007

REMARKS

Applicants have amended the claims to more particularly define the invention taking into consideration the outstanding Official Action. Applicants have canceled claims 3 and 14 from the present application without prejudice or disclaimer as these limitations have been added to claims 1 and 12 respectively. Applicants submit that the amendments to the claims are fully supported by the specification as originally filed and no new matter is introduced.

The objection to claim 1 because of the following informalities: improper grammar has been obviated in view of the amendments to the claim. Applicants submit that the support for the amendment to claim 1 can be found at page 8, lines 13-14 and page 12, lines 10-13 of the specification as originally filed. Accordingly, it is most respectfully requested that this objection be withdrawn.

The objection to claims 4 and 15 because of the following informalities: improper grammar has been obviated in view of the amendments to the claims. Accordingly, it is most respectfully requested that this objection be withdrawn.

The objection to claims 5, 11, 16 and 22 because of the following informalities: claims must each be only one sentence has been obviated in view of the amendments to the claims. Accordingly, it is most respectfully requested that this objection be withdrawn.

The objection to claims 9 and 20 because of the following informalities: improper grammar has been obviated in view of the amendments to the claims. Accordingly, it is most respectfully requested that this objection be withdrawn.

The objection to claims 10 and 21 because of the following informalities: improper grammar has been obviated in view of the amendments to the claims. Accordingly, it is most respectfully requested that this objection be withdrawn.

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The objection to claim 12 because of the following informalities: improper grammar has been obviated in view of the amendments to the claims. Applicants submit that the support for the amendment to claim 1 can be found at page 8, lines 13-14 and page 12, lines 10-13 of the specification as originally filed. Accordingly, it is most respectfully requested that this objection be withdrawn.

The objection to claim 19 because of the following informalities: a word is omitted has been obviated in view of the amendments to the claim. Accordingly, it is most respectfully requested that this objection be withdrawn.

The rejection of claims 4, 6, 7, 11, 14, 15, 17, 18, and 22 under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicants regard as the invention has been carefully considered but is most respectfully traversed in view of the amendments to the claims. Accordingly, it is most respectfully requested that this rejection be withdrawn.

Applicants most respectfully submit that all of the claims now present in the application are in full compliance with 35 USC 112 and clearly patentable over the references of record.

The rejection of claims 1, 6, 11, 12, 17 and 22 under 35 USC 102(b) as being anticipated by Yang et al. has been carefully considered but is most respectfully traversed in view of the amendments to the claims and the following comments.

Applicants wish to direct the Examiner's attention to MPEP § 2131 which states that to anticipate a claim, the reference must teach every element of the claim.

"A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). "The identical invention must be shown in as complete detail as is contained in the ... claim." *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 1236, 9 USPQ2d 1913, 1920 (Fed Cir. 1989). The elements must be arranged as required by the claim, but this is not an *ipsissimis verbis* test, i.e., identity of terminology is not required. *In re Bond*, 910 F.2d 831, 15 USPQ2d 1566 (Fed.Cir. 1990).

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In this regard, in order to distinguish the difference in the compositions of liquid organic-based solution between the present invention and Yang(US 6,326,083), Applicants have incorporated claims 3 and 14 (claims 3 and 14 were not be rejected under 35 U.S.C. 102 by the Examiner) into claims 1 and 12, respectively. Since Yang does not disclose the method wherein said liquid organic-based solution is an organic-based spin-on-glass mainly composed of siloxane, mentioned by the Examiner.(Refer page 5, lines1-2 of the OA) Accordingly, the method of the amended claims 1 and 12 of the present invention is not disclosed in Yang and it is most respectfully requested that this rejection be withdrawn.

Moreover, since the amended claims 1 and 12 are not anticipated by Yang, the dependent claims 6, 11, 17 and 22 that depend on claim 1 or 12 are not anticipated by Yang, either. Accordingly, it is most respectfully requested that this rejection be withdrawn.

The rejection of claims 2-4, 9, 13-15 and 20 under 35 USC 103(a) as being unpatentable over Yang in view of Livesay et al. has been carefully considered but is most respectfully traversed in view of the amendments to the claims and the following comments.

Although the present invention and Yang(US 6,326,083) are both related to a method of modification for the surface of glass substrates of the microfluidic chip, the objects of the inventions and the mechanisms of the modifying method are both different from each other and are unobvious to one of ordinary skill in the art to which the invention pertains.

(1) The objects of the inventions are different:

The Yang reference provides surface coatings for microfluidic devices that effectively suppress biopolymer adsorption, wherein the surface coatings provide stable and reproducible electroosmotic flow (see the column 2, lines 14-19 of Yang). However, the object of the present invention is a method of modification for the surface of glass substrates, which suppress occurrence of electroosmotic flow effect (see page 1, lines 7-9 of the specification of the present application). Accordingly, the objects of the invention are totally different from the present invention and Yang.

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(2) The mechanisms of the modifying method are different:

According to column 29, lines 47-52 and FIG. 13 of Yang, Yang uses modifying reagent having hydrophilic functional groups to react with the -OH functional groups of the surfaces of the glass substrates and thereby gain a hydrophilic surface for preventing proteins adsorption onto the surfaces of the microchannels in the microfluidic devices. Besides, in Yang, the functional groups of the surfaces of the glass substrates are certain to produce positive and negative charge (e.g. Si-O⁻) after the modification of the surfaces(see column 2, lines 19-22 of the Yang reference). As such, the surface coating of Yang necessarily cause electrical-double-layer effects, and further produce electro-osmosis flow. Moreover, according to Fig. 13 of Yang, the functional groups -OH or -NH₂ are still exposed to the environment in order to producing the electroosmotic flow. However, the modifying method of the amended claim 1 of the present invention uses an organic-based spin-on-glass(SOG) which is mainly composed of siloxane or silsesquioxane to attach a layer of organic film on the surface of glass microchannels(see page 12, lines 4-10 of the Applicants' specification) and thereby produce a hydrophobic surface for preventing the occurrence of electro-osmotic flow. Additionally, the surface coatings of the present invention isolate the -OH functional groups of the glass substrates from the environment and thereby suppress the occurrence of electro-osmosis flow. Accordingly, the modifying mechanisms of the present invention are obviously different from Yang. Accordingly, it is most respectfully requested that this rejection be withdrawn.

The rejection of claims 5, 7, 8, 16, 18, and 19 under 35 U.S.C. 103(a) as being unpatentable over Yang in view of Livesay, and further in view of Chen, et al. has been carefully considered but is most respectfully traversed in view of the amendments to the claims and the above comments. Basically, the teachings of Chen et al do not overcome the deficiencies of the primary references. Accordingly, it is most respectfully requested that this rejection be withdrawn.

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The rejection of claims 10 and 21 under 35 U.S.C. 103(a) as being unpatentable over Yang in view of Livesay, and further in view of Chua et al. has been carefully considered but is most respectfully traversed in view of the amendments to the claims and the above and following comments. Again, the teachings of Chua et al. do not overcome the deficiencies of the primary references. Accordingly, it is most respectfully requested that this rejection be withdrawn.

The present invention is desired to gain an effect that can suppress the occurrence of electro-osmosis flow, however, Yang teaches a method to produce electro-osmosis flow of glass-based microfluidic channels. Not only the purposes but also mechanisms of the present invention and the Yang reference are completely different. Therefore, those skilled in the art cannot have any motivation to combine Yang with other cited references to teach the present invention.

Comparing the modifying method of the present invention and well known prior art, the present invention has some advantages as follow (see page 6, lines 22-24 and page 7, lines 1-12 of Applicants' specification of the present application):

(1) The present invention eliminates time-consuming chemical processing steps, such as silanization or esterization.

(2) The modifying method of the present invention can use any kinds of glass substrates.

(3) The substrates after the processing of the present invention can be preserved in the air without special preservation environment.

In summary, the method of the present invention is patentable when the invention is considered as a whole. One skilled in the art cannot combine the cited references to teach the present invention without impermissible hindsight. The Deere factors have not been met and these have not been changed by KSR as noted in the Obviousness Guidelines. Accordingly, it is most respectfully requested that this rejection be withdrawn.

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In view of the above comments and further amendments to the claims, favorable reconsideration and allowance of all the claims now present in the application are most respectfully requested.

Respectfully submitted,
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